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| 10/550,664             | 09/26/2005  | Martina Kuhn         | P05,0248            | 1972             |
| 26574                  | 7590        | 01/09/2009           |                     |                  |
| SCHIFF HARDIN, LLP     |             |                      | EXAMINER            |                  |
| PATENT DEPARTMENT      |             |                      | AUSTIN, AARON       |                  |
| 6600 SEARS TOWER       |             |                      |                     |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                    |
|------------------------------|--------------------------------------|------------------------------------|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/550,664 | <b>Applicant(s)</b><br>KUHN ET AL. |
|                              | <b>Examiner</b><br>AARON S. AUSTIN   | <b>Art Unit</b><br>1794            |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 28 October 2008.

2a) This action is FINAL.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 16-33 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 16-33 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 26 September 2005 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO/06/08)  
Paper No(s)/Mail Date 9/26/05

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_

5) Notice of Informal Patent Application

6) Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

Applicant's election of Group I, claims 16-26 in the reply filed on 10/28/08 is acknowledged. The restriction requirement, as set forth in the Office action mailed on 9/29/08, has been reconsidered in view of the fact the restriction requirement was erroneously written based upon US practice rather than PCT practice. **The restriction requirement is hereby withdrawn.**

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

***Information Disclosure Statement***

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper."

***Claim Objections***

Claim 27 is objected to because of the following informalities: line 7 recites "boy" rather than "body". Appropriate correction is required.

Claim 33 is objected to because of the following informalities: line 4 recites "storing" rather than "stirring". Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 28 and 31-32 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 28 and 31-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 28 and 31-32 provides for the use of a shaped body of ceramic material, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 30 recites the limitation "of metal powder" in line 9. There is insufficient antecedent basis for this limitation in the claim. More particularly, it is not clear as to whether this is the same metal powder as recited in line 5 or a different metal powder, thereby rendering the claim indefinite.

Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: (1) the structural relationship between the ceramic shaped body and the substrate, and (2) the relationship between the metal powder of line 5 and the metal powder of line 9. With respect to the substrate, the claim describes the shaped body undergoes a volume

change employed for a press fit with the substrate. It is unclear as to how the volume change causes or assists in the press fit and how the substrate and shaped body are attached as a result. With respect to the recitation of the metal powders, as noted above, it is not clear as to whether this is the same metal powder as recited in line 5 or a different metal powder rendering the structural relationship indefinite.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16-17, 27-30, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lauf et al. (US 6,248,286 or US2001/0033039) in view of Klug et al. (EP1122227).

Please note, as US 6,248,286 and US2001/0033039 to Lauf et al. are nearly identical as applied herein, they are addressed together below.

Lauf et al. teach a gel-casting method of making a shaped body comprising mixing a solution comprising metal oxide and a metal powder (e.g., Lauf et al. '286 at Example IV and claim 2) which is distributed in a colloidal fashion as evidenced by the gradient formed. The mixed solution/slurry is placed in a mold where it is gelled prior to drying to form a green body (e.g., Lauf et al. '286 at claim 1, column 2, lines 1-3).

Sintering the green body results in a shaped body (e.g., Lauf et al. '286 at column 2, lines 4-6).

Lauf et al. do not teach a freeze-gelling step in forming the green body. However, gel-casting is understood to include freeze-drying (e.g., see Applicant's definition of gel-casting provided at page 1, line 25 to page 2, line 5).

In addition, Klug et al. teach gel-casting using a combination of heating and freeze-drying to produce a dried green body with reduces warpage. Therefore, as Klug et al. clearly teach drying of a green body using freeze-drying provides the advantage of a dried green body with reduced warpage, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use freeze-drying in the drying step of Lauf et al.

Regarding claims 16-17, Lauf et al. do not teach the atmosphere used when sintering.

Klug et al. teach gel-casting wherein the sintering step is performed in an oxygen-containing atmosphere to promote oxidation (column 6, lines 55-56; paragraph [0030]; and Applicant's specification at page 2, lines 7-12). Therefore, as Klug et al. clearly teach gel casting with a sintering step performed in an oxygen-containing atmosphere provides the advantage of promoted oxidation, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to perform the sintering step of Lauf et al. in an oxygen-containing atmosphere to promote oxidation.

Regarding claim 28, the shaped body formed may be used in the field of biotechnology (e.g., Lauf et al. '286 at column 6, lines 59-60).

Regarding claims 28-30, the shaped body is used in the field of casting molds as it itself is formed by such a casting.

Regarding claim 33, as like materials are formed in a like manner to the claims as outlined above, the product is expected to be as claimed. Further, metal powder is included in the solution described above to form the ceramic. The ceramic undergoes a volume change during sintering as like materials are used in a like manner. Further, the ceramic may be formed adjacent a substrate (Figs. 1 and 2).

Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lauf et al. (US 6,248,286 or US2001/0033039) in view of Klug et al. (EP1122227), and further in view of Novich et al. (US 4,882,304).

Please note, as US 6,248,286 and US2001/0033039 to Lauf et al. are nearly identical as applied herein, they are addressed together below.

Lauf et al. teach a gel-casting method of making a shaped body as described above.

Lauf et al. do not teach doping with a reinforcement, conductive materials, or fibers.

Novich et al. teach addition of fibers and/or whiskers for imparting structure toughness, stiffness, and tensile strength to ceramic products (column 2, lines 24-26 and 36-38). Therefore, as Novich et al. clearly teach inclusion of fibers and/or whiskers in a solution used to form a ceramic material provides the advantage of imparting structure toughness, stiffness, and tensile strength to the ceramic product (column 2,

lines 24-26 and 36-38), it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to include fibers and/or whiskers in the solution of Lauf et al.

Regarding claims 18-19, the fibers and/or whiskers provide reinforcement for ceramic materials as outlined above and may be comprised of oxides, carbides, or nitrides (column 3, lines 43-68).

Regarding claims 20-21, the fibers and/or whiskers may comprise silicon carbide, a conductive material (column 3, lines 46, 61, and 68).

Claims 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lauf et al. (US 6,248,286 or US2001/0033039) in view of Klug et al. (EP1122227), and further in view of Clark et al. (US 4,921,731).

Please note, as US 6,248,286 and US2001/0033039 to Lauf et al. are nearly identical as applied herein, they are addressed together below.

Lauf et al. teach a gel-casting method of making a shaped body as described above.

Lauf et al. do not teach doping with a reinforcement, conductive materials, or fibers.

Clark et al. teach addition of reinforcement materials to the sol medium used to form a ceramic in order to strengthen the coating (column 11, line 66 to column 12, line 8). Therefore, as Clark et al. clearly teach inclusion of reinforcement materials in a sol medium used to form a ceramic provides the advantage of imparting strength to the

ceramic, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to include reinforcement materials in the solution of Lauf et al. used to form a ceramic.

Regarding claims 18-19, the reinforcement materials may be comprised of carbides or nitrides in the form of fibers or the like (column 12, lines 1-8).

Regarding claims 20-21, the reinforcement materials may comprise silicon carbide, a conductive material (column 12, line 7).

Regarding claim 22, the reinforcement materials may comprise carbon fiber doped in a targeted manner in that it is targeted for inclusion in the solution (column 12, line 7). Further, as Lauf et al. target location of the portions of the solution in the form of a gradient, the carbon fiber will be doped in a targeted manner to be a part of that same gradient.

Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lauf et al. (US2001/0033039) in view of Klug et al. (EP1122227).

Lauf et al. teach a gel-casting method of making a shaped body as described above.

Further, Lauf et al. '039 teach infiltration of another phase, typically a metal, into the shaped body (paragraph [0047]).

Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lauf et al. (US2001/0033039) in view of Klug et al. (EP1122227), and further in view of Fox et al. (US 5,900,277).

Lauf et al. teach a gel-casting method of making a shaped body as described above. Further, Lauf et al. '039 teach infiltration of another phase, typically a metal, into the shaped body (paragraph [0047]).

Lauf et al. do not teach a firing step after infiltration of the other phase.

Fox et al. teach the mechanical properties of a ceramic infiltrated with another phase, such as a metal, can be tailored for the desired use by subjecting the infiltrated ceramic to further heat treatment after infiltration (column 9, lines 13-43). Therefore, as Fox et al. clearly teach subjecting an infiltrated ceramic to further heat treatment provides the advantage of tailored properties such as fracture toughness, fracture strength, and hardness, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to subject the infiltrated ceramic of Lauf et al. to heat treatment after the infiltration step.

Claims 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lauf et al. (US 6,248,286 or US2001/0033039) in view of Klug et al. (EP1122227), and further in view of Jeng et al. (US 6,383,443).

Please note, as US 6,248,286 and US2001/0033039 to Lauf et al. are nearly identical as applied herein, they are addressed together below.

Lauf et al. teach a gel-casting method of making a shaped body as described above.

Lauf et al. do not teach use of the ceramic formed as a heat exchanger or for chromatography.

Jeng et al. teach ceramic materials formed by a gel process are suitable for use as heat exchangers, filters (the equivalent of a chromatography column), etc. (column 1, lines 9-14). Therefore, as Jeng et al. clearly teach porous ceramic materials are suitable for use as heat exchangers or filters, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the porous ceramic materials of Lauf et al. as heat exchangers, filters, or the like using the molding process taught as set forth above.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AARON S. AUSTIN whose telephone number is (571)272-8935. The examiner can normally be reached on Monday-Friday: 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Aaron Austin/  
Examiner, Art Unit 1794